

# The Executive Office of Environmental Affairs 5-Year WATERSHED ACTION PLAN GUIDANCE



## Members of the WAP Task Force

EOEA would like to thank the following members who provided their immeasurable time, effort, and input into the structure and content of this guidance document. We would also like to acknowledge the work of all the former watershed team leaders, former team members, and countless other agency staff and watershed community partners.

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## **I. INTRODUCTION**

The Watershed approach typifies a process that brings together government and non-government partners to identify, discuss, prioritize, and implement issues, concerns, goals, objectives, and actions. These are aimed at preserving, protecting, and restoring the water resources and adjoining land resources of the Commonwealth of Massachusetts. The Watershed Action Plan (WAP) is a reflection of this cooperative effort to plan a unified and directed approach to managing our watersheds. It also represents a tool by which smart growth can be achieved. This document provides guidance and ensures consistency in all WAPs across the state.

## **II. HOW TO USE THE GUIDANCE?**

The 5-year Watershed Action Plan (WAP) is a document that outlines various issues and priority areas in a watershed to help direct actions over a five-year period. Created by watershed partners, it charts a course of action for state agencies, watershed community partners and other decision makers within or related to the watershed. The WAP is a long-term strategy, which sets specific targets and measures. It is a concise and action-focused document. It is a culmination of elements of the watershed protection approach, formed through collaboration and consensus, reflecting the interests and concerns of different stakeholders within the watershed community.

This guidance document simplifies the WAP process, and provides definite recommendations on the WAP structure to enhance and promote expeditious completion of the plan. It sheds light on the process and the time frame involved. It is a flexible guideline, in that the process may be modified to cater to the uniqueness of each watershed.

## **III. PURPOSE OF THE WAP**

The WAP creates an understanding of the watershed, identifies priority issues, and defines priority actions that protect, improve, and restore watershed resources. The WAP does this by providing an overview of the issues facing the watershed. This is informed in part by the outcome from projects in preceding year agency work plans, and partly by an extensive literature review. This sets the stage for the next five years of watershed protection and management.

The WAP also acts as an information tool and directs actions within the watershed. By bringing together the knowledge, commitment, and resources of all the community partners, as well as state and federal partners, the WAP can ensure that all major issues in the watershed are identified and adequately addressed through prioritized action strategies. The WAP integrates the main elements of the watershed approach: water quantity, water quality, habitat, open space and growth, recreation, outreach, and education.

Finally, the WAP and the process involved in developing and implementing the plan improves communication and coordination between the various state, federal and local governments, watershed organizations, businesses, regional organizations, and local citizens. It is also instrumental in expanding public involvement in watershed activities.

#### **IV. AUDIENCE**

The watershed action plan provides a coordinated approach to management in a watershed, and to foster environmental protection. The issues and priorities that are established by the local stakeholders (municipal government, non-governmental organizations, businesses, and local and regional groups) and state and federal partners will help guide agency agendas, and help direct agency funding and regulatory decisions to the highest priority issues. The WAP will also help outline priorities and actions that are needed at the municipal level so that actions established by the local community will be realized. Lastly, the WAP will guide watershed activities for the next five years and chart a course for watershed research, monitoring, and implementation activities in the watersheds by soliciting additional funds through other available grant programs.

#### **V. PROCESS**

It is estimated that development of the WAP document (including an assessment) should take about 6 months - from initial research of issues to the final draft (see Table 1). It is built upon outreach and projects that have been undertaken in earlier years. The 6-month period begins with a review of research documents and assessments conducted in the watershed over the previous 5-years.

At the outset of the WAP development process, i.e., in Month 1, the author/vendor must prepare a detailed time schedule of the entire 6-month period that includes dates for public meetings, draft documents, reviews, etc. This will help in prioritizing the WAP and facilitate keeping it on track.

##### **1. *Parties Involved***

A selected author/vendor will take the lead in managing the planning process and producing the WAP with input from state agencies and from a broad group of watershed stakeholders. At the outset of the WAP development process, a WAP steering committee *must* be established that has a balance of representatives of the major interests in the watershed. This steering committee should include the Regional Planning Agency (RPA), key municipal representatives, state and federal agencies, watershed groups, businesses, and interested local citizens. The steering committee will be responsible for guiding the process and work needed to inform and develop the WAP, including overseeing the necessary research and outreach. The committee will, through discussions and research, inform the contents of the WAP.

##### **2. *Bibliography***

At the outset of this planning effort, a list of reports, articles, studies, and plans relevant to the watershed should be compiled and researched. This bibliography will help support, lend credibility to, and document how and where issues, actions, and priorities are identified.

### 3. *Public Process*

Public participation is a critical requisite for a successful and executable WAP. It is imperative to generate input, support, buy-in, and recommendations from the public.

Extensive public outreach and review is essential to ensure that key issues are identified and priorities are set. The input process should be coordinated by the WAP steering committee using the services of the author/vendor responsible for developing the plan. Input must be actively sought from all parts of the watershed at regular intervals during the WAP development process. The local and regional groups can provide detailed expertise on issues and priority setting. These relationships with the local constituency may be advanced via stream teams, RPAs, or team development. Both the former entities work closely with local government and citizens.

An *initial* fact-finding effort should involve outreach and communication with specific municipal representatives<sup>1</sup> from each town in the watershed. Depending on the size of the watershed, this could take the form of separate meetings with each municipality or regional forums of subwatersheds or regions of towns. In addition, surveys, emails, phone follow-ups, and other information gathering techniques may be used. A high and consistent level of interaction with the towns will help ensure that watershed issues identified in the WAP are developed in consultation with municipal officials. The interactions will also identify the types of data that exist in the towns as well as identify and understand town priorities and actions that may be incorporated into the WAPs.

Prior to this municipal outreach, the author/vendor should ensure the communities have basic information they need in order to participate in the process. This could take the form of a briefing to each municipality, submitted along with the meeting notice, which includes:

- A brief introduction on the WAP purpose and process
- A call for towns to share their issues
- The main overarching issues facing the watershed
- Issues that may be of interest to the town
- Incentives for the town to participate, and
- Information that is requested of the town

The *second phase* of the outreach effort should take place after incorporating information acquired from municipal officials into the literature survey. This phase should involve public meetings in all subwatersheds or regions in the watershed. At this stage, the public is presented with a draft list of the most pressing issues facing the subwatershed and the watershed as a whole, as well as recommended actions based on input from town officials and various assessment data. Input is sought from the public to update, add, edit, change, and prioritize issues and actions.

The first part of the public participation thus includes collection of data and the initial input of issues and concerns. The second part includes a confirmation and clarification process.

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<sup>1</sup> Local government structure may differ in towns. Municipal representatives may be the Town Planner, Town Manager, Conservation Commission, Board of Selectmen, planning boards, Board of Health, DPW, water suppliers, etc.

After incorporating these public comments, a draft WAP is developed. This plan must then be made available on the EOEa Watershed website and/or the author/vendor website for easy access to the public and for a *third* and more comprehensive review and comment period.

#### 4. *Review Process*

- ❖ **Internal Review:** Preliminary drafts of the WAP should be made available for comment first to the WAP Steering Committee and the EOEa/water policy staff. Final drafts should be submitted for comment to members of the water policy staff in Boston.
- ❖ **Agency Review:** The draft WAP will be reviewed by agency representatives on the steering committee, and an Interagency WAP Review Committee. It is the responsibility of these agency representatives to ensure that the issues, priorities and actions, particularly those related to agency actions or funding are agreed to by the agency. The review will take place on two occasions, i.e., once prior to and once after the public input process. If, based on agency comments, further changes are necessary, these will be carried out by the author/vendor. The author/vendor should respond to agency comments either by email or any other convenient form of communication.
- ❖ **Municipal Review:** All communities in the watershed must be given the opportunity to provide input, present their issues and priorities, and review the plan during different stages of the WAP development. Municipalities should also lend support to the WAP, either to specific action items (preferred) or to the WAP as a whole, via letters of support.
- ❖ **Non-Governmental Organization (NGO) Review:** The WAP should include active input and review from members of nonprofit watershed groups.
- ❖ **Support Letters:** Once the WAP has been reviewed and approved it should include letters of support from the EPA, state environmental agencies, the RPA, NGO's, towns, and area legislators. State environmental agencies must agree on the overall priorities of the watershed and those of the subwatersheds, and where possible endorse prioritized action items. Similarly, before the final draft is completed, the author/vendors are encouraged to get letters of support from local elected officials for the WAP as a whole and where possible, for specific action strategies.

## 5. *Schedule*

The author/vendor and WAP Steering Committee should first develop a detailed timeline and task schedule to outline the steps needed to complete a WAP.

<b>TIMEFRAME</b>	<b>ACTION</b>
<b>Month 1 OUTREACH</b>	Identify and meet with key municipal representatives; develop a bibliography of existing data and reports; identify/reconfirm main issues in the basin. Form the WAP Steering Committee.
<b>Month 1-2 RESEARCH and ASSESSMENT</b>	Research of issues; sampling and data gathering. Research and assess data gathered during previous years to identify main issues, pinpoint areas still in need of research, and develop a watershed assessment. Solicit information from all partners, i.e., state agencies, environmental groups, RPA's, and businesses. Coordinate with municipal officials and other local partners to solicit town specific data, issues and priorities for the watershed assessment.
<b>Month 3</b>	Preliminary draft of document providing overall outline and priority issues, goals, objectives and actions, segregated by subwatershed/issue. Comments on draft by the WAP Steering Committee, state agencies, and incorporate into second draft.
<b>Month 4</b>	Present second draft (including comments from towns and municipalities) for public review via meetings in subwatersheds.
<b>Month 5-6</b>	Incorporate public comments into a third draft of the WAP. Post the draft on the EOEa watershed website and make it available to state agencies for further comment (3 week period). Produce and distribute the final WAP.

Table 1: Proposed timeline for the WAP development

## 6. *The Document*

The intent, purpose, and structure of the WAP as well as its implementation strategy must be clearly defined and explained both in the executive summary as well as the introductory chapter. The document itself may be structured in different ways depending on the characteristics of each watershed. Issues, priorities, strategies, and actions can be detailed in two different ways. In those watersheds where issues are common across subwatersheds, they may be delineated by **issue**. Where possible, action items must indicate the subwatershed where the action will occur. In all other cases, issues, goals and actions must be characterized by **subwatershed**. To make the issues and actions more tangible for the local communities the information may also be presented in an additional layer - by town.

Irrespective of the structure chosen, all sections in the WAP must be integrated in the conclusive chapter and in the executive summary. Also, the document should include a section that places the 5-year actions in context with larger more long-term goals for the watershed. The WAP should thus act as a planning document.

Each WAP must identify the issues **by priority** in the watershed as well as within a subwatershed. A clear connection should be made between subwatershed priorities and those at the watershed level. Within each issue, goals and actions must be clearly identified. A goal is defined as the desired state of the resources while an action is a means to achieve the goal. Action strategies may either be specific restoration, remediation, assessment, monitoring or planning efforts. Actions may also be an indirect route to achieving a goal, for example, outreach, education, surveys, workshops or conferences, training, etc.

## VI. WAP CONTENT

The WAP document may be conceptually divided into two main parts. The first part is an assessment that provides useful information about the status of the watershed and the main prioritized issues affecting the watershed. This information is based on all available literature, including results from projects undertaken in prior work; information derived from various studies, plans, and research documents that are generated from state, federal, and local government, educational institutions, planning agencies, and consulting firms (see Appendix 1). This consolidated information may be presented either as a separate assessment document or summarized (with appropriate references) in a distinct chapter in the WAP. It is the information that is derived from this assessment that forms the basis for determining action strategies within each prioritized issue.

The second part of the WAP establishes specific actions that need to be implemented in the watershed to meet specified goals in each of the prioritized issues. Actions may be either short-term or long-term. All desired action strategies must be determined and outlined irrespective of the level of commitment achieved. Although a commitment is desired for all actions, it may not always be possible at the time of development of the WAP. Also, recommended actions should be directed toward each of the different audiences in a watershed: specific towns, RPAs, state and federal environmental agencies, watershed groups, businesses, and the public. Any actions that are recommended for beyond a 5-year term must be stated as a priority for the next 5-year planning effort.

### ***Draft Outline***

The following outline is to provide an idea of the topics that may be covered in the WAP.

- A. Executive Summary: include the main highlights of the WAP i.e. brief outline of the process; brief description of the watershed; list overall priority issues; list subwatershed delineation and priority issues; and implementation strategy.
- B. Table of Contents
- C. List of Tables, Graphs, Maps, and Appendices
  - 1. Possible Maps
    - Watershed Map
    - Water Resources
    - Land Resources (land use map)
    - Habitat – fisheries, rare species
    - Open Space
    - Current Development and Buildout Maps
    - Location of NPDES discharges, 21E sites
- D. Introduction
  - 1. Structure/Outline of the document – Describe the framework and layout of the document, purpose of the WAP, target audience, etc.
  - 2. Watershed Overview – Briefly highlight physical and biological characteristics, socio-economic features, land use, and recreational resources.
    - i. Physical Characteristics
      - Location
      - Water Resources - Ponds, Lakes, Coastal Waters and Reservoirs
      - Geology, Soils, and Groundwater
      - Climate
      - Hydrology - Wetlands
      - Water Quality Conditions
      - Water Quantity Conditions
      - Land Use, Ownership, and Management
    - ii. Ecosystem Characteristics – types of ecological niches
    - iii. Social and Economic Setting
      - Demographics
      - Buildout Analyses
      - Growth
      - Recreational and Scenic Resources
      - Cultural, Historic, and Archeological sites
      - Infrastructure
      - Scenic Resources
      - Agriculture

- iv. Environmental Conditions – Describe main issues, by priority, affecting the watershed. This description must include each topical area (water quality, water quantity, water use and conservation, habitat, open space, recreation, education and outreach, growth and land use – see Appendix 3) in order of priority. Major issues as well as priorities should be substantiated by scientific data and informed by public input. Depending on the watershed, some of the issues above may be of less or no significance. In that case, it should be mentioned.
3. Process Summary of the development of the WAP.
- E. Watershed Vision – Include in one paragraph the long-term goals for the watershed and overall vision.
  - F. Watershed players, activities, and achievements already concluded within the last five years, as well as those underway.
  - G. Implementation Priorities - The issues, objectives, and actions must be clearly **prioritized** based on scientific data and informed by the public input process. It must be clear how the priority issues and actions were determined. This prioritization and qualification will help state agencies in making crucial permitting and funding decisions. This section should include:
    - 1. Watershed characteristics with respect to the main focus area of the watershed - describe and prioritize major environmental issues (main findings from the assessment).
    - 2. Subwatershed Characteristics with respect to the main focus areas (see Appendix 3 for details).
    - 3. Prioritized goals, objectives, and actions within each prioritized issue.
    - 4. Action plan matrix either by year, subwatershed or hotspot area (see Appendix 9)
      - i. Goal
      - ii. Objective
      - iii. Action to be taken
      - iv. For each action include the following:
        - Responsible party - Responsibilities must be assigned irrespective of whether the party commits to prioritize and implement it within their agency, organization, etc. (for potential responsibilities, see Appendix 5).
        - Resources involved including overall costs, possible sources of funding, and technical assistance
        - Schedule of implementation (Year)
        - Subwatershed
        - Measurable results – it is important that actions are results-oriented leading to an environmental improvement (see Appendix 6).
    - 5. Policy, legislative, regional, and statewide level recommendations that emerge from the planning effort.
  - H. Implementation strategy – Provide a framework describing how the various priority actions will be implemented. One option is the development of project scopes (to be used as applications toward various funding sources).

- I. Conclusion and visionary statement with prioritization of future actions.
- J. Appendices - possible appendices may include:
  - 1. Watershed committee members, partners and participants
  - 2. Public participation process and public input/comments
  - 3. Major permits issued in the watershed – include information regarding permittee, municipality, permit number, date issued and expired, receiving waters, type of permit, etc.
  - 4. List of all watershed lakes, streams, and river segments
  - 5. List of impaired waters
  - 6. Lake and impoundment data
  - 7. Hydraulic information on dams
  - 8. Bibliography
  - 9. Glossary of terms
  - 10. DEP-NPS action strategies
  - 11. Funding sources – state and federal

## **Appendix 1: Data Source by Agency**

The following is a compilation of the kind of data that can be acquired from different local, state, and federal governmental agencies.

### **ACOE**

Water quality Data  
Flow Data  
Habitat/Wetlands restoration

### **CZM**

Stormwater  
Mussel Monitoring  
Salt Marsh Restoration  
MORIS Data  
Marine Monitoring  
Harbor Management Plans  
ACEC Management Plans

### **DEP**

Water Quality Assessments  
River, Lake, Marine Water Quality Data  
Waste Disposal  
303d List  
21E Site Information  
Major Permits: NPDES permits  
(major/minor), groundwater discharge,  
Chapter 91, Water Management Act  
Invertebrate Data  
Permitted Water Suppliers (Annual PWS  
Compliance Report)  
Source Water Assessment Program  
Outstanding Resource Waters  
Stormwater Management  
Fish Toxics  
Biological Assessment  
Eelgrass and Wetlands Data/Maps,  
Fish Population and Habitat Data,  
TMDLs

### **DCR (former DEM)**

Lake and Pond Data  
Lake and Pond Invasive Species  
In Stream Flow  
Land Use – Greenways & Trails  
Clean Lakes Program  
Forest Health/Information

Non-threshold users & users below  
100,000 gals

Habitat  
Chapter 61 Lands  
Scenic Landscape Inventory  
Dam Data  
Hydrologic Analysis  
Flow Information: stream flow  
thresholds, low flow assessments,  
stream statistics  
Identification of Stressed Basins  
Precipitation Data  
All USGS Cooperative Programs' Data  
State Park Statistics, Trends, etc.  
Floodplain Control, Hazard Management

### **DCR (former MDC)**

Water Quality Data  
Habitat  
Land Use  
Forestry  
Master Plans  
Flood Control levels for USGS

### **DFG (former DFWELE)**

Sampling  
Habitat Plans/Assessments  
BIOMAP  
Fish Data  
Fish Passage  
Recreation Maps  
Shoreline Surveys  
Shellfish Reports/Monitoring  
Rare and Endangered Species

### **DAR (former DFA)**

Chapter 61A Lands  
APR Lands  
Farm Management Plans and Marketing  
Viability

**EOEA**

MassGIS  
CPI

**EPA**

Water Quality Data  
Sediment Data

**FEMA**

Flood Maps

**FERC**

Hydro Projects  
Dam Re-licensing

**MEPA**

List of Activities by Watershed  
Summary of Projects

**MHD**

**National Park Service**

**NRCS**

**RPAs**

Land Use  
Growth Plans  
Nonpoint and Stormwater Assessments  
Parcel Data  
Population Trends  
Open Space Plans  
Transportation Planning Process/  
Regional Transportation Plans  
Economic Activity in the Watershed  
Employment  
Wellhead Protection Studies

**GIS**

Municipality Buildout Analysis

**Towns**

Parcel Data  
Zoning Data  
Facility Master Plans  
Open Space Plans  
Buildout Analyses  
Capital Improvement Plans  
Comprehensive Plans  
Land Protection Plan  
Municipal Infrastructure Report  
Community Action Statements  
Wastewater Plans  
Watershed/Pond/Lake Plans  
Capital Facilities Plans

**USF&W**

Habitat Assessment  
Fish Passage

**USGS**

Sampling Data  
Flow Data  
Habitat Data  
Water Resources  
Fish Passage  
NAWQA Program

**Watershed Assoc./NGO's  
(COLAP, Land Trusts)**

Water Quality Data  
Lake and Pond Data  
Open Space/Conservation Restrictions  
Shoreline Surveys

## **Appendix 2: Issue Information**

The section on watershed overview should include information about each of the following focus areas. Where information and data is not available, it should be noted and planned for in the WAP as per established watershed priorities. The following is a list of data that should be considered when conducting an assessment for a watershed. This list will give an idea of the more significant issues in a watershed.

1. Water Quantity: Without enough water in our streams, lakes and aquifers, our ecosystems will be parched and human activities will ultimately be restricted. To effectively manage our watersheds, especially in light of recent drought conditions, it is imperative that this issue is addressed first. Each WAP should include an analysis of:
  - Instream flows
  - Water withdrawals in the basin
  - Inflow-outflow, water budgets
  - Interbasin transfers
  - Dam releases and their effects
  - Number of wells and their withdrawals
  - Water demand
  - Matrix of water users
  - Water shortages
  - Water conservation methods
  - Stormwater
2. Water Quality: Chemical indicators are one of the most commonly used indicators of water quality and consequently of river health. To gauge the quality of water in our streams and lakes effectively, the following information is necessary:
  - DEP water quality assessments
  - Sediment analysis
  - Public health advisories
  - 303d lists
  - TMDLs
  - NPDES permits
  - Drinking water compliance data/violations
  - Nonpoint Source Pollutants
  - Well closures
  - Septic system failures
  - Shoreline surveys
  - Dam safety
  - Shellfish closures
  - Fish advisories

3. Biological Data/Habitat: Aquatic biota is often used as the litmus that identifies structural or functional integrity of riparian ecosystems.
  - Fisheries
  - Shellfish
  - Invasive species
  - Bio-assessments/macroinvertebrates
  - Vernal pools
  - Species restoration plans
  - Resource inventory and analysis
  - Priority habitats
  - Essential fish habitat
4. Open space, land use and growth: With growing pressures on our lands and increasing demands for water and land resources, it is important to protect and conserve what we currently have and plan for a sustainable future. An analysis of the following will help move us in the right direction of smart growth:
  - Buildout analyses
  - Open space plans (local and regional)
  - Demographic data, transportation plans
  - Land trusts
  - Sustainability index
5. Recreation
  - Public access board sites
  - State's work plan
  - Greenway trails
  - Fish stocking data
6. Outreach and Education
  - Stream teams
  - Newsletters
  - Events
  - Media
  - Town meeting votes on environmental issues

### **Appendix 3: Data Contacts by Agency**

<b>AGENCY/SOURCE</b>	<b>CONTACT (Name, #)</b>
<b>ACOE</b>	
Water Quality Data	
Flow Data	
Habitat/Wetlands Restoration	Bill Hubbard 978-318-8552 or Chris Hatfield 978-318-8520
<b>CZM</b>	<b>Watershed Contact: Todd Callaghan 617-626-1233</b>
Coastal Hazards	Storm Damage, Rebecca Haney-Inglin x1228
Stormwater	Stormwater Discharge Permitting, Todd Callaghan ext 1233
Mussel Monitoring	Christian Krahforst ext 1216
Aquaculture	Paul Somerville ext 1203
Marine Monitoring	Christain Krauforst ext 1216
Wastewater Treatment Plant/Facilities Plans	Todd Callaghan ext 1233
NPDES (Power Plants and WWTP's)	Todd Callaghan ext 1233
Water Quality	Todd Callaghan ext 1233
Habitat/Wetlands Restoration	Bruce Carlisle, ext 1205
<b>DEP</b>	<b>Main contact Rick Dunn (Water Quality) 508-767-2874/ Arthur Screpetis (Grants) 508-767-2875</b>
Water Quality Assessment	DEP CONTACT: Rick McVoy 508-767-2877
Waste Disposal	DEP NPDES CONTACT: Paul Hogan; SERO Dave Burns 508-946- 2838
303d List	Arthur Johnson 508-767-2873
TMDL's	Russ Isaac, TMDL Coordinator, 508-767-2876
21E Site Information	Need to distinguish between state and federal sites: 292-5500
NPDES Permits – major/minor	Bryant Firmin, NPDES Coordinator, 508-849-4003; Paul Hogan; SERO Dave Burns 508-946- 2838
Invertebrate Data	Bob Nuzzo, DEP Worcester 508-767-2792; Art Johnson 508-767-2873
Permitted Water Suppliers (Annual PWS Compliance Report)	Regional Water Supply Chief. SERO Larry Dayian 508-946-2769
Source Water Assessment Program	Kathy Romero, DEP Boston 617-292-5727

AGENCY/SOURCE	CONTACT (Name, #)
Outstanding Resource Waters	Bruce Bouck, DEP Boston 617-556-1055; Russ Isaac 508-767-2876
Stormwater Management	Stormwater Discharge Permitting, Phase II Coord, Jenny Scarlet 508-767-2797 or Linda Domizio, Phase II Planner, 508-849-4005
Fish Toxics	Bob Maietta 508-767-2793 also Art Johnson 508-767-2873
Biological Assessment	Art Johnson: 508-767-2873
<b>DCR</b>	<b>Watershed Contact: Mike Gildesgame, 617-626-1371</b>
Lake and Pond Data	Jim Straub 617-626-1411, Anne Monnelly 617-626-1395 or Steve Asen 617-626-1355
In Stream Flow	Vicki Gartland 617-626-1369 or Linda Marler 1384
Land Use – Greenways & Trails	Jennifer Howard 413 -586-5706 x 18
Forestry	617-626-1250
Forest Fire Control	Mike Tirrell 413-784-1828 ext. 26
Habitat	Jack Lash 508-792-7716 x 137 or Andy Backman 508-278-0789
Chapter 61 Lands	Mary Griffin 617-626-1303 or Irene Del Bono 617-626-1315
Flood Hazard Management/NFIP	Richard Zingarelli 617-626-1406
Ocean Sanctuaries	Mike Gildesgame 617-626-1371
Scenic Landscape Inventory	Jessica Rowcroft 617-626-1380 or Patrice Kish 617-626-1378
Dam data	Bill Salomaa 617-626-1410 or Dave Clark 508-792-7716 x 115
Hydrologic Analysis	Vicki Gartland 617-626-1369 or Linda Marler 1384
ACEC Program	Leslie Luchonok 413-586-5706 x 21 or Liz Sorenson 617-626-1394
Water Quality Data	
Habitat	
Land Use	Planning Office
Forestry	
Landscape Architecture	Planning Office
Dam Data	727-5114
<b>DFG</b>	<b>617-626-1590</b>
Sampling	
Habitat (Ipswich)	

<b>AGENCY/SOURCE</b>	<b>CONTACT (Name, #)</b>
Fish Data/Toxics	626-1590
Fish Passage	626-1590
Recreation Maps	
Rare and Endangered Species	Natural Heritage, Henry Woosley 508-792-7270 ext 200
Dam Data	Karen Pelto, ext 1542
<b>DAR</b>	<b>617-626-1700</b>
Chapter 61A Lands	Deputy DAR Commissioner
Ag. Preservation Restriction Lands	Chris Chisholm 508-792-7716
<b>DMF</b>	
Shellfish Monitoring Program	Varies by shoreline area. Frank Germano and Neil Churchill for South Shore - Pocasset Office
Fish Passage	Dick Quinn
<b>EOEA</b>	<b>617-626-1000</b>
SCORP	Jennifer Soper, ext 1015
Water Quality Data	Bruce Carlisle, ext 1205
<b>EPA</b>	
Water Quality Data	NPDES Data - Freedom of Information Request Office
Sediment Data	
<b>FEMA</b>	
Flood Maps	DCR MEMA Office: Rich Zingarelli 617-626-1406
<b>FERC (Federal Energy Regulatory Commission)</b>	
Hydroprojects	
Dam Re-licensing	
<b>Massachusetts Highway</b>	
Environmental Enhancement Program	Linda Walsh, State Coordinator, 617-973-8052
District Office, SE Mass	Mark Carmichael, District Manager, 508-884-4253

AGENCY/SOURCE	CONTACT (Name, #)
<b>RPAs</b>	<b>SRPEDD: 508-824-1367</b>
Land Use	
Growth Plans	
Non-point and Stormwater assessments	
Parcel Data	
Population Trends	
Open Space Plans	
<b>Towns</b>	
Parcel Data	Assessor or Engineering Offices
Zoning Data	Planning Board
Facility Master Plans	Wastewater Treatment Superintendent or DPW Superintendent
Open Space Plans	Planning or Conservation
Buildout Analyses	MassGIS
<b>USF&amp;W</b>	
Habitat assessment	
<b>USGS</b>	
Sampling Data	
Flow Data	
Habitat Data	
Water Resources	
Fish Passage	
NAWQA Program	
<b>Watershed Assoc./ NGO's (COLAP, Land Trusts)</b>	
Water Quality Data	
Lake and Pond Data	
Open Space/Conservation Restrictions	
Shoreline Surveys	

## **Appendix 4: Participation on Action Strategies**

The information presented below is to help watershed partners in determining areas of collaboration with the different entities within a watershed.

### **MUNICIPAL**

Interboard cooperation to achieve municipal goals

Sewering

#### **Water Quantity**

Infiltration/Inflow reduction

Stream gauge installation

Flood warning response plan

DPW maintenance of floodways

Flood control

Monitoring of wells

Develop/update water conservation by-laws

Implement non-structural flood control measures

Adopt policy of no flood-prone buildings in watershed

Restrictive and consistent floodplain management

#### **Habitat**

Lake and pond assessment

Riverfront zone review

Pond restoration

List of invasive species sites

Non-native species management

Encourage planting native species

Wetlands inventory and restoration

Wetland banking feasibility

Adoption of a regulatory review area adjacent to wetlands

#### **Open Space**

Update Open Space Plans

Update zoning by-laws – amend to protect streams, banks, riparian zone

Land use planning in coordination with sewage treatment & water supply

#### **Water Quality**

Priority area sewerage

Remediation

Sewage Treatment upgrades

Stormwater compliance

Implement NPS recommendations

Landfill capping

Identify nonpoint source pollution

Storm drain analysis

Reduction of nutrient loadings

Reduction of road sand deposition into waterways

Reduction of stormwater discharges

#### **Recreation**

Create trails

Public access inventory

Provide canoe access

#### **Other**

Update Comprehensive and other Municipal Plans

Implement EO 418

Implement EO 385

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### **WATERSHED GROUPS**

#### **Water Quantity**

Develop model water conservation plans

GIS land use analysis for water suppliers

Development of incentive-based model ordinance for septic systems inspection and maintenance

#### **Water Quality**

Prioritize monitoring sites based on 303d list

#### **Habitat**

Invasive species reduction

Riverfront zone review  
River cleanups

**Recreation**

River recreation survey

**Other**

Outreach and education  
Public forums

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**RPAs**

Prioritize monitoring sites based on 303d list  
Zoning by-laws  
Model and matrix of existing municipal laws  
Coordinated land-use and resource  
constraints  
Consultation with towns on open space  
plans

**DEP**

DO monitoring  
Biomonitoring stations  
Reissue minor NPDES permits  
Sampling plans  
Remediation  
TMDL development  
Lake and pond assessments  
5-year WMA permit reviews  
Addition of water quality monitoring  
stations  
Decrease direct stream discharge of  
stormwater  
Stormwater management

**DCR (former DEM)**

Dam studies with prioritized  
recommendations  
Comprehensive water supply plans  
Forest management for public water  
supplies  
Flow modeling  
Instream flow studies

Level of water use and their effect on supply  
Flood control mechanisms  
Regional river recreation management plan

**DCR (former MDC)**

ACEC Plans  
Flood Control

**DFG**

Shoreline surveys  
Prioritize monitoring sites based on 303d list  
Examine streambed conditions for ability to  
meet anadromous habitat  
Examine potential for reversal of fish  
passage blockages  
Recommendations for river restoration  
Riparian restoration  
Review stream morphology and habitat  
characteristics  
Pond and lake eutrophication assessment

**USDA – NRCS**

Assistance on agricultural issues (with  
cooperation of farmer)  
Nonpoint source assessment  
Stormwater management  
Operation and maintenance of municipal  
dams  
Shellfish bed remediation  
Sedimentation and erosion control  
Development impact reviews

## **Appendix 5: Measurable Results Metrics**

Metrics measure the progress in the watershed on a particular issue and action. The following may be used in the WAP as measures against specific action strategies.

### **Water Quality**

- # of river miles, lakes and ponds assessed
- # of miles supporting designated uses
- # of river miles surveyed by volunteers with a QAPP
- # of lakes and Ponds studied
- # of shoreline surveys conducted by volunteers
- # of new miles designated as "wild and scenic" by state and federal
- # of stream/river clean up projects conducted in watershed
- # of lakes and ponds safe for swimming

### **Water Quantity**

- Amount of impervious surface
- Change in base flows
- # of hydrology assessments conducted
- Average quantity of water withdrawals
- # of water level measurements
- # of stream gauges
- # of stressed basins

### **Habitat**

- # of habitat studies/surveys conducted
- # of species threatened, or endangered areas
- Acres of wetlands restored
- # of dams in the watershed, number of those in need of repair, and number of those that provide fish passage
- # of lakes/ponds with non-native invasive species
- # of river miles identified with non-native invasive species
- % of watershed that is protected open space
- # of certified vernal pools
- # of miles with fish swimming
- Type of fish communities
- # of acres in Chapter 61

### **Land use and potential threats to water quality**

- # of landfills
- # of high threat operations to groundwater or surface water sources (from DEP SWAP)
- # of permitted or registered water withdrawals greater than 100,000 gallons
- # of interbasin transfers proposed, and number of those approved

% of impervious surface by subwatershed  
% of known 21E sites remediated or in remediation

**Local planning**

List of towns with approved open space plans  
List of towns with a recent master plan (less than ten years old)  
# of approved cluster or conservation-planned subdivisions and percentage of total subdivisions that are cluster or conservation planned  
# of communities with digitized parcel information  
# of towns with environmental zoning by-laws: cluster, aquifer protection, etc.

**Land Use/Open Space**

# of acres of protected "greenspace" in the watershed  
% of developed property within 200 ft. buffer zone of rivers within the watershed

**Recreation**

# of trail miles added  
# of public access points  
# of beach closure days  
# of local trail plans

**Outreach and Education**

# of training or awareness/education programs conducted in the watershed  
# of presentations on watershed issues in municipal meetings  
# of workshops and watershed-wide forums held  
# of press releases on watershed issues

**Shared Responsibility**

# of statewide "micro" watershed groups  
# of businesses engaged in watershed work  
# of lakes and ponds with active advocacy group  
# of grants written  
# of grants received  
# of community/civic awards distributed

## **Appendix 6: Glossary of Terms**

### **Commonly Used Words and Their Definitions**

**Aquifer** – An underground geologic formation capable of holding large quantities of water. Aquifers may serve as a source of drinking water.

**Bacteria** – Microscopic one-celled organisms found everywhere. Some bacteria have the potential to be a public health threat. In Massachusetts there are defined limits for a specific bacteria, fecal coliform, in water bodies.

**Basin** – A topographic designation based on drainage patterns. The water flowing within a basin (or watershed) eventually flows to one common point.

**Best Management Practices (BMPs)** – Techniques which may be nonstructural, structural, or managerial capable of effectively and economically reducing nonpoint source pollution.

**Biomonitoring** – Examining the biological (living) communities in a given body of water (or other habitat) to determine the complexity, diversity, and species composition in the water body. This information helps assess the overall health of the habitat.

**Board of Health (BOH)** – In Massachusetts, it is the local board responsible for health issues in the community including septic systems.

**Buffer** – An area of no or limited activity along a waterway or wetland functioning as a filter of pollutants contained in runoff, a wildlife corridor, and several other benefits.

**Clean Water Act (CWA)** – A federal law establishing comprehensive national policies for water quality management. The essence of the CWA is to have all U.S. waters “fishable and swimmable”.

**Conservation Commission (ConComm)** – A volunteer board within a Massachusetts community responsible for administering the Wetland Protection Act and the River Protection Act.

**Effluent** – Used water as it leaves a treatment system. Examples are discharges from sewage treatment facilities or water used in an industrial cooling system.

**Fresh Water** - Water with less than 0.5 parts per thousand dissolved salts.

**Geographical Information System (GIS)** – A relatively new and useful computerized system able to create data layers amenable to transfer onto maps and other useful products for assessing a river basin. Data layer examples include all open space, watershed boundaries, and land use.

**Groundwater** - Water found in the spaces between soil particles and cracks in rocks underground (located in the saturation zone). Groundwater is a natural resource that is used for drinking, recreation, industry, and growing crops.

**Hydrograph** - Graph showing variation of water elevation, velocity, streamflow, or other property of water with respect to time.

**Hydrologic Cycle** - (also known as the water cycle) The paths water takes through its various states - vapor, liquid, solid - as it moves throughout the ocean, atmosphere, groundwater, streams, etc.

**Impervious Surface** – A surface which does not allow water to penetrate, such as pavement.

**Interbasin Transfer** – A transfer of drinking water or wastewater from one basin into another. These transfers are regulated by the state (Department of Environment Management). Transfers between basins but within the same town do not require a permit.

**Nitrate** – A form of nitrogen readily usable by vegetation. Excessive amounts of nitrate can disrupt ecological balances in a natural system. High levels of nitrate in drinking water pose a health threat, especially for children (blue baby syndrome).

**Nonpoint Source Pollution (NPS)** – Pollution originating from widespread, multiple and not easily identifiable sources. Stormwater is a significant contributor of nonpoint pollutants since it washes pollutants from impervious surfaces such as roadways.

**National Pollution Discharge Elimination System (NPDES)** – A federal program under the Clean Water Act created to monitor point source discharges such as sewage treatment plant effluent and industrial discharges.

**Nutrient** - Element or compound essential for animal and plant growth. Common nutrients in fertilizer include nitrogen, phosphorus, and potassium.

**On-site Systems** – An individual system for treating wastewater, commonly called a septic system.

**Precipitation** - The part of the hydrologic cycle when water falls, in a liquid or solid state, from the atmosphere to Earth (rain, snow, sleet).

**Phosphorus** – A nutrient often serving as the limit to growth in freshwater systems. Excessive amount of phosphorus in a water body can lead to a condition of unchecked plant growth known as eutrophication.

**Recharge** - Groundwater supplies are replenished, or recharged, when water enters the saturation zone by actions like rain or snow melt.

**River Protection Act (RPA)** – A law creating a 200-foot river resource area around most of the perennial rivers and streams in Massachusetts to better protect the quality of our river resources. The RPA expands the scope of the Wetland Protection Act.

**Runoff** - Precipitation that flows over land to surface streams, rivers, and lakes.

**Safe Drinking Water Act (SDWA)** – A federal law passed in 1974 creating a federal program to monitor and increase the safety of drinking water. Amended in 1986 to establish new enforcement responsibilities for the EPA and changes in nationwide safeguards.

**State Revolving Fund (SRF)** - A fund from which a community can apply for zero interest loans to assess or improve wastewater problems in the community. Scope of the SRF has recently been expanded.

**Storm Drain** - Constructed opening in a road system through which runoff from the road surface flows into an underground system.

**Temporary Wetland** - A type of wetland in which water is present for only part of the year, usually during the wet or rainy seasons; also known as vernal pools.

**Title 5** – The Massachusetts regulation overseeing on-site wastewater treatment systems. Improperly or poorly functioning on-site systems (septic systems) have the potential to adversely impact nearby waterways.

**Total Maximum Daily Load (TMDL)** – The Federal Clean Water Act requires each state to identify waters for which effluent limitations are not stringent enough to meet water quality standards. The TMDL established the allowable pollutant loading from all contributing sources to achieve water quality standards. TMDLs may also be applied to waters threatened by excessive pollutant loading (i.e., nonpoint sources).

**Tributary** – A stream or river flowing into a larger, mainstream river.

**Unconfined Aquifers** - An aquifer in which the upper boundary is the water table.

**Wastewater** – Water, which is used for some purpose, then discarded or “wasted”. Usually refers to the water used in households, businesses, and industry and containing wastes.

**Water (H<sub>2</sub>O)** - An odorless, tasteless, colorless liquid made up of a combination of hydrogen and oxygen. Water forms streams, lakes, and seas, and is a major constituent of all living matter.

**Water-bearing Rocks** - Several types of rocks can hold water, including: sedimentary deposits (sand and gravel), channels in carbonate rocks (limestone), lava tubes or cooling fractures in igneous rocks, and fractures in hard rocks.

**Water Table** - The point below the land surface where groundwater is first encountered and below which the earth is saturated. Depth to the water table varies widely across the country.

**Watershed** – An area of land contributing runoff to one common point. A large watershed may be divided into smaller sub-watersheds. Massachusetts has been divided into 27 major watersheds (The land area from which surface runoff drains into a stream, channel, lake, reservoir, or other body of water; also called a drainage basin-USGS definition).

**Wetland** – Area of land with saturated or nearly saturated soils most of the year and serves as an interface between land-based and water-based environments. Other common names for wetlands are sloughs, ponds, and marshes.

Drawn from DFG (formerly known as DFWELE) – River ways Program; USGS.

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### **Appendix 8: Sample Action Matrices**

Matrices may be set up either by Action item or by Subwatershed.

1.

Action	Subwatershed or Hotspot Area	Responsible Party	Year/Schedule					Proposed Funding Source	Measurable Results
			1	2	3	4	5		
Goal 1 Objective 1 Actions									
Objective 2 Actions									
Goal 2 Objective 1 Actions									

2.

Subwatershed	Responsible Party	Year/Schedule					Proposed Funding Source	Measurable Results
		1	2	3	4	5		
SUBWATERSHED NAME								
Goal #								
Objective #								
Action 1								
Action 2								
Action 3								